CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope.

The purpose of this document is to provide guidance in hydrologic analysis of interior areas for planning and design investigations. The document was developed to satisfy needs expressed by Corps of Engineers field offices for procedural and technical guidance in performing hydrologic assessments of interior areas.

1-2. Interior Systems.

a. An interior area is defined as the area protected from direct riverine, lake, or tidal flooding by levees, floodwalls or seawalls and low depressions or natural sinks. Figure 1.1 is a conceptual illustration of an interior area and attendant physical works. The levee or wall associated with an interior area is generally referred to as the line-of-protection. The line-of-protection excludes flood water originating from the exterior but normally does not directly alleviate flooding that may subsequently occur from interior runoff. In fact, the line-of-protection often aggravates the problem of interior flooding by blocking drainage outlets. Protected interior areas, formerly flooded from the river (lake or coastal area) by slowly rising flood waters generated from regional storms, may now be subject to flooding from events that are more localized, occur more suddenly, and provide less prior warning. The flooding may be aggravated by coincident high river, lake, or coastal stages. The interior flooding that results may be of the nuisance variety (shallow, temporary flooding) but can be in an extreme case as dangerous (or more so) as the situation without the levee.

b. Interior flood waters are normally passed through the line-of-protection by gravity outlets when the interior water levels are higher than water levels of the exterior (gravity conditions). The flood waters are stored and/or diverted and pumped over or through the line-of-protection when exterior stages are higher than that of the interior (blocked gravity conditions). Gravity outlets, pumping stations, interior detention storage basins, diversions and pressure conduits are primary measures used to reduce flood losses within interior areas. Other structural and nonstructural measures, such as reservoirs, channels, flood proofing, relocations, regulatory policies, and flood warning-emergency preparedness actions, may also be integral elements of interior flood loss reduction systems.

c. Interior areas are studied to determine the specific nature of flooding and to formulate alternatives that enhance the national economy, and secondarily enhance the environment, social well being, and regional development. The selected plan for implementation is the one that best meets these objectives.

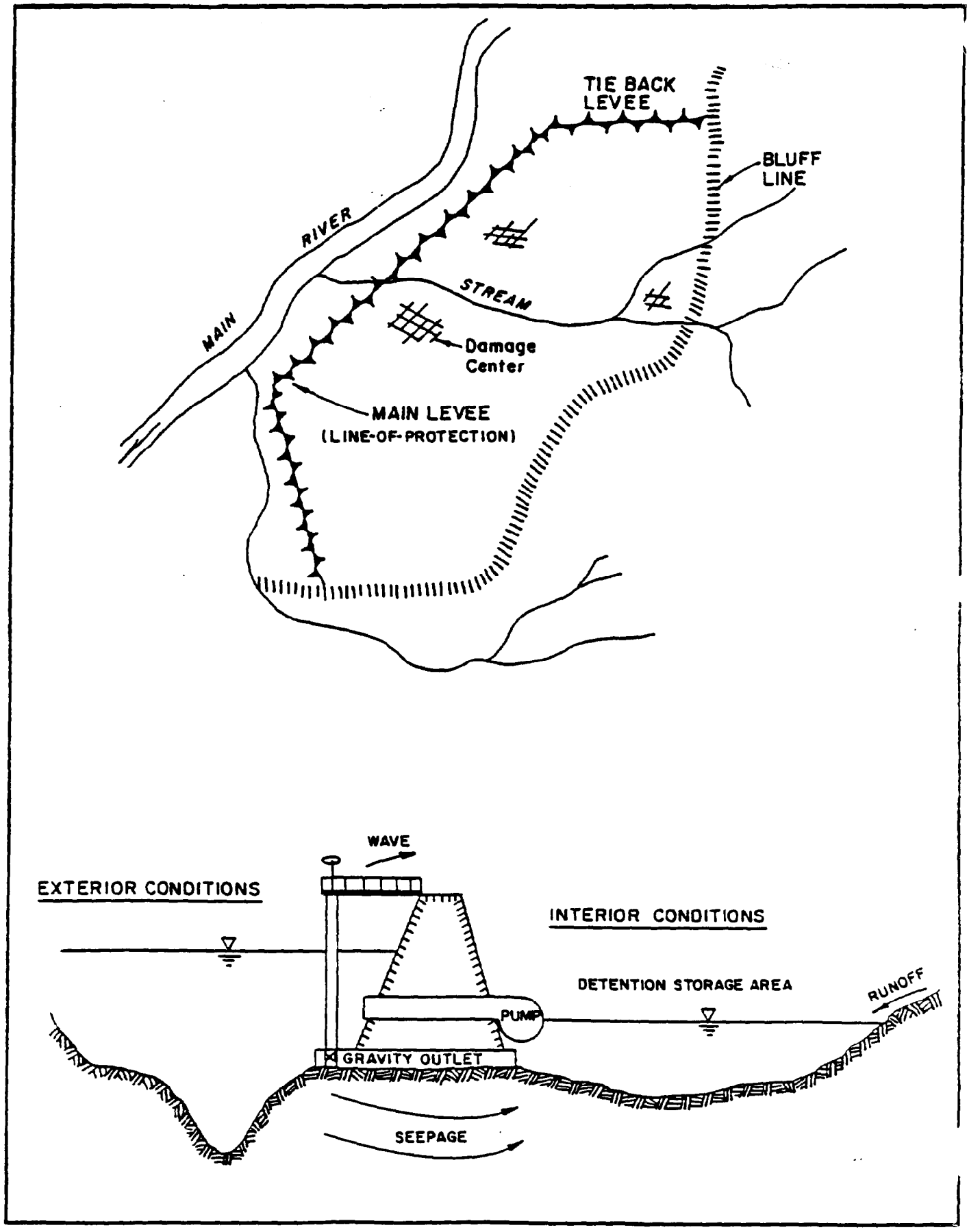

FIGURE 1.1 Schematic of Interior System

d. Hydrologic analysis of interior areas is complex because of interior flooding combined with uncertainty of stages on the exterior side of the line-of-protection. The investigation is often difficult. Records may be scant or nonexistent, land use (and thus runoff) may have changed from the past and is often continuing to change, natural drainage paths have been altered, and coincident flooding (a technically complex subject) is the common situation. Areas are generally small (less than 10 mi^2 though some are much larger) and the measures that should be considered are numerous.

e. Interior area investigations are differentiated from other studies only by hydrologic analysis factors and the uniqueness of commonly implemented flood loss reduction measures. The study process and types of studies conducted to plan and design flood loss reduction actions are identical to those of other investigations. These studies include planning investigations, survey reports, and other forms of feasibility studies, design studies (General and Feature Design Memoranda), and similar studies for small projects under continuing authorities. Analysis of interior areas is relevant to formulation and evaluation procedures, level of protection considerations, and hydrologic, economic, environmental, and social assessment criteria as established by present federal planning and design policies and regulations.

f. Interior area planning studies are an essential aspect of feasibility studies. Although facilities and costs may at times be small components of a major line-of-protection project, the elements are often major items in the negotiated local sponsor agreements and can represent a significant proportion of local costs.

1-3. Interdisciplinary Study Requirements.

a. The present precept of planning is that it be conducted by an interdisciplinary group performing their studies in an open public participation environment. Corps guidance states:

> "An interdisciplinary approach is to be used in planning to ensure the integrated use of natural and social sciences . . ." (Reference 7).

b. The hydrologic engineer is a participating member of an interdisciplinary study team that typically includes representatives from economic, environmental, social, and engineering disciplines. The study is normally coordinated by a study manager who is also a team member. Continued interface with these and other participants is required since results must be compatible with needs for performing flood damage, cost, environmental, social, and other assessments. An important early task for the team is to tailor the investigation to the problems and needs of the study area under investigation. Important issues, concerns, and study conduct will be defined and a procedure for continuing coordination among participants will be prepared and adopted. Integration of hydrologic information with this range of interdisciplinary study requirements reflects the importance of developing reliable study estimates. Hydrologic strategies and analysis procedures

developed are dependent to a large degree on these study requirements. Therefore, close coordination and continuous communication with other disciplines is essential, from the initiation of the study through final decisions. The hydrologic engineer is responsible for participating (taking the initiative if necessary) in needed study coordination for activities that are related to hydrologic engineering.

1-4. Organization of Manual. This manual is designed to provide guidance for hydrologic studies associated with the planning and design of flood loss reduction measures for interior areas. Emphasis is on the interface of hydrologic studies with elements involved in planning investigations. Most hydrologic studies are conducted to provide technical data for formulating and evaluating solutions to flooding problems. The manual sets forth pertinent requirements and defines the commensurate hydrologic study needs. It provides chapters on: a description of the general study process, progressing from feasibility through feature design investigations; an outline of basic hydrologic assumptions and strategies for performing the studies; and a description of available hydrologic analysis procedures for assessing interior areas. Subsequent chapters describe relevant aspects of potential flood loss reduction measures, give an overview of special topics and issues, and outline reporting requirements. Appendixes include: references and selected examples. A glossary of terms is also provided.